

RHODE ISLAND DEPARTMENT OF HEALTH
DIVISION OF DISEASE PREVENTION AND CONTROL
OFFICE OF COMMUNICABLE DISEASES



ARBOVIRUS SURVEILLANCE
FINAL REPORT
2004 SEASON

JANUARY 2005

ARBOVIRUS SURVEILLANCE, 2004

RHODE ISLAND

BACKGROUND

West Nile virus is an emerging infectious disease that was first discovered in the African country of Uganda in 1937, and in recent years has spread beyond its traditional boundaries, causing illness in birds, horses, and humans in Europe and now the United States. It was first discovered in the U.S. in 1999 in New York City. Since that time, WNV has been detected in humans, animals, and mosquitoes in 47 states from coast to coast.

The efforts to confront the potential threat of West Nile Virus (WNV) in Rhode Island in 2000 involved a coordinated effort between the Rhode Island Department of Health (HEALTH), Division of Disease Prevention and Control, Office of Communicable Diseases, Division of Laboratories, and the Rhode Island Department of Environmental Management (RIDEM). Prior to the 1999 discovery of WNV in New York City, Rhode Island had assembled a Mosquito Disease Advisory Group. This ad hoc group of mosquito control experts, environmental and public health professionals was established in 1992 and has guided the state through numerous EEE outbreaks, including the major event in Westerly in the late summer of 1996. Agencies represented include DEM, HEALTH, the Governor's Office, URI and the U.S. Geological Survey.

In 2000, Rhode Island was awarded funding from the Centers of Disease Control and Prevention to develop bird, mosquito, human, and equine encephalitis surveillance activities, enhance mosquito trapping and testing efforts, develop laboratory capacity to identify WN virus infections in humans and other animal species, and provide education and public outreach to reduce human exposure to WN virus and other arboviruses. In order to prepare for WNV activity in the Ocean State, representatives from the Rhode Island Department of Health (HEALTH), Office of Communicable Diseases, and Division of Laboratories, and the Rhode Island Department of Environmental Management (RIDEM) participated in weekly conference calls with the Centers for Disease Control and Prevention (CDC) to obtain technical information and policy guidance. A WNV working group was formed, which met on a biweekly basis with the primary purposes of: (1) developing and implementing prevention and response efforts and (2) coordinating surveillance activities. The HEALTH/RIDEM WNV working group made decisions regarding public education activities, bird and mosquito collection/routing/and laboratory analysis, submission of surveillance data for reporting purposes, and recommendations to the RI Mosquito Advisory Board.

In 2000, a dead bird surveillance program was established, headquartered in the DEM's Office of Mosquito Abatement Coordination (MAC) Office. The vast majority of the 3,000+ phone calls to the advertised hotline were from the public. The remainder of reports was from veterinarians, wildlife rehabilitators, the Audubon Society, and communities' animal control officers. The Bird Surveillance Coordinator screened out some 2,000 calls for those birds that did not meet the testing criteria. 328 were necropsied at the HEALTH laboratory, and subsequently tested at a University of RI BL3 laboratory (The HEALTH Lab had not developed testing capacity, yet). As a result of this effort, WNV was first detected in Rhode Island on August 8, 2000, in a dead crow. 70 crows and 18 bluejays (from fifteen of Rhode Island's thirty-nine communities) were WNV-positive. In addition, EEE was isolated from one crow, one raven, one bluejay, and one sparrow. HJ virus was isolated from two sparrows. Veterinary surveillance yielded a positive finding. One equine tested positive for West Nile Virus in September. The positive result came from a horse stabled in Wakefield that was euthanized at Tufts University School of Veterinary Medicine in Massachusetts on August 28. Tests were performed and confirmed by the National Veterinary Services Laboratories in Ames, Iowa for the United States Department of

Agriculture. A total of 1,113 mosquito pools were tested, yielding one EEE isolation, six HJ isolations, and no WNV isolations. In 2000, human WNV testing was confined to surveillance testing on reported cases of encephalitis. Four persons who met the case definition were tested and all were negative.

Applying the lessons learned both in-state and nationally in 2000, laboratory testing for human cases was expanded beyond encephalitis to include the testing of appropriately collected specimens on selected cases of aseptic meningitis and cases of 'Guillan Barre' Syndrome, reported from May through October in 2001. It was a quiet year in Rhode Island, in terms of human surveillance. 41 cases of aseptic meningitis and two patients with encephalitis were tested; however no human cases of WNV were detected. Veterinary surveillance produced similar results; the HEALTH Laboratory tested two horses for serological evidence of WNV infection and both horses tested negative.

In 2001, Rhode Island recorded its first WNV positive mosquito pools on July 16, 2001. Mosquitoes were collected on a weekly basis from mosquito traps placed at approximately 24 locations. A total of 1856 mosquito pools (representing 14,870 mosquitoes) were submitted for testing, 14 pools tested positive for WNV and were from nine towns.

Dead birds were reported in high numbers. Of the 390 dead birds submitted for testing, 245 birds tested positive. The first positive bird was reported on May 29, 2001. Of the 245 birds infected with WNV in 2001, 204 (83.3%) were classified as crow species, 37 (15.1%) were blue jays, and four (1.6%) were other species. Positive birds were found in 18 towns.

Surveillance for arboviruses continued in 2002 and Rhode Island experienced its first documented case of WNV in humans. Two cases were reported to the Rhode Island Department of Health in September. HEALTH confirmed the state's first human case of West Nile Virus infection in an elderly female diagnosed with West Nile viral infection from Providence County. The patient became ill in mid September and she tested positive for WN virus in both cerebrospinal fluid (CSF) and serum samples by an IgM-capture enzyme-linked immunosorbent assay (ELISA).

A second probable case was also detected during the 2002 season. The case was classified as a West Nile fever case and did not require hospitalization for her illness. The resident of Providence County is over the age of 50 and became ill during the second week of September. Positive test results on blood samples were confirmed at the HEALTH Laboratory.

During the 2002 surveillance season, one horse tested positive for West Nile Virus. The horse was from Coventry and tested positive for WNV on October 28, 2002. The horse was not vaccinated for WNV, demonstrated classic symptoms and tested positive by IgM Capture Elisa. The horse, a 26 year old gelding Arab cross, responded to treatment very well, and recovered fully from WNV. It is believed that the horse was exposed in the first week to 10 days of October.

From May 28 to October 6, 2002, 1, 441 dead birds were reported to DEM MAC. Of the 249 avians tested for WNV, 167 birds tested positive for WNV. 152 crows tested positive for WNV in addition to 12 bluejays, one hawk, one mourning dove, and one parakeet. The positive birds were reported between June 16, 2002 to October 15, 2002 from 25 towns.

A total of 1417 mosquito pools (11,876 mosquitoes) were submitted for arboviral testing in 2002. Four mosquito pools tested positive for WNV. The first positive mosquito pool (*Culex pipiens*) was collected on August 28, 2002. Three other positive pools were trapped on September 17, 2002; two pools (*Aedes vexans* and *Culex pipiens*) were trapped in Providence County, the other positive pool (*Aedes vexans*) from Bristol County.

In 2003, Rhode Island documented its first human fatality from West Nile Virus. Six other human cases of the virus were reported in the state ranging in age from 42 years to 72 years with onsets beginning the first week of September to the third week of October. Rhode Island, as well as other states along the Eastern seaboard, also experienced an unusual number of EEE isolations in animals and mosquito pools, for the first time since 1996. No human cases of EEE were reported; however five horses and several birds in Rhode Island died from the virus.

From June 2 to October 28, 2003, 651 dead birds were reported to DEM MAC and 75 birds were submitted for testing. A total of 47 of the submitted birds tested positive for WNV. 31 crows, 14 bluejays, one goldfinch, and one great horned owl tested positive. Four of the submitted birds tested positive for EEE and included one blue jay and 3 homing pigeons. The EEE and WNV positive birds were reported between August 14, 2003 and October 7, 2003 from 25 towns.

A total of 2383 mosquito pools (22,017 mosquitoes) were submitted for arboviral testing in 2003. Seven mosquito pools tested positive for WNV and seventeen mosquito pools tested positive for EEE during the 2003 season. The first WNV positive mosquito pool (*Culex pipiens*) was collected on August 21, 2003 and the last WNV positive pool (*Culiseta impatiens*) was trapped on October 11th. The first EEE positive mosquito pool (*Culex pipiens*) was collected on September 10, 2003 and the last positive pool was collected on October 20. The distribution of positive mosquito pools was in Newport, Providence and Washington counties.

During the 2003 surveillance season, two horses tested positive for West Nile Virus. The first WNV positive horse was stabled in Charlestown, and became ill on September 15. The second horse was stabled in Hopkinton, and became ill around September 25. Both horses recovered. Five horses tested positive for EEE. The first EEE positive horse of the season became ill on September 3 in Westerly. In addition to the horses, two emus tested positive for EEE, and one horse tested positive for both EEE and WNV. The horse from a private stable in Lincoln became ill on October 1. Serological testing by the National Veterinary Services Laboratory in Ames, Iowa confirmed that the horse had both EEE and WNV. The horse recovered.

2004 marked the fifth year that WNV has been a potential threat to the citizens of Rhode Island. It was a significantly quiet year. RI confirmed WNV infection in only five dead birds. EEE positive findings were detected in three birds, seven mosquito pools and one equine. The following sections describe detailed surveillance for Arboviruses in birds, mosquitoes, mammals, and humans.

RHODE ISLAND METHODS

Avian surveillance

In 2004, DEM re-activated its dead bird surveillance hotline for the summer. Residents were encouraged to report crows or bluejays that died within 24 hours of discovery and that showed no signs of external injury from mid-May through mid-October. DEM scaled back avian surveillance and implemented a selective sampling method. A sampling of birds that meet the above criteria were retrieved for testing, however DEM mapped the locations of the birds reported in order to identify areas where additional mosquito trapping and testing was needed. Birds meeting testing criteria were transported daily to the HEALTH Laboratory for necropsies. PCR assays were conducted at the HEALTH Laboratory. Dead bird surveillance ended on October 19, 2004.

Mosquito surveillance

From May 30 to October 16, 2004 an average of 38 trap sites were set weekly with CO₂-baited CDC light traps and/or gravid traps. Overnight mosquito collections were done and females were sorted by species into groups of 50 or less. Trapping was expanded where "clusters" of WNV and EEE positive birds were found, positive mosquito pools, or if human cases were detected. Mosquito pools were assayed (via RT-PCR and cell culture, with IFA confirmation) weekly for WNV, EEE, and other selected viruses at the HEALTH Laboratory. Mosquito surveillance was halted on October 16, 2004.

Veterinary surveillance

Veterinarians are required to report any suspected animal cases with neurological illnesses to DEM, Office of Agriculture. The State Veterinarian assists community veterinarians to arrange testing for WNV or EEE in horses that have severe neurological disease.

Human surveillance

To identify human illness caused by West Nile Virus, physicians, hospitals, and laboratories are required to report patients with viral encephalitis (any age), aseptic or suspect viral meningitis over the age of 17 years, or Guillain-Barré syndrome immediately to HEALTH Office of Communicable Diseases (OCD) from June through October.

When reports are received, the cerebrospinal fluid and/or serum specimens are case managed to the HEALTH Laboratory for arboviral testing. OCD nurses encouraged suspect cases to submit convalescent serum specimens and the nurses coordinated serum collection at an in-state commercial lab with multiple draw stations throughout the state. The commercial laboratory forwarded the serum to the State Laboratory for convalescent testing. The HEALTH Laboratory performed IgM and IgG capture ELISA tests for WNV on suspected human cases. Any initial serologically positive samples are confirmed by plaque reduction neutralization testing at the HEALTH Laboratory and a sample is forwarded to CDC independently for confirmation. Enhanced surveillance for WNV testing ended on October 31, 2004, although testing continued to be available at the HEALTH Laboratory upon special request.

RESULTS

Avian Surveillance

From May 30 to October 23, 2004, 257 dead birds were reported to DEM MAC. 58 birds were submitted for testing. See Table 1.

Table 1: Avian Surveillance, by county, Rhode Island, 2004					
County	Number of dead birds reported	Number of birds tested	Number of positive birds		
			WNV	EEE	TOTAL
Bristol	11	6	1	0	1
Kent	58	7	0	1	1
Newport	32	6	0	0	0
Providence	103	25	4	1	5
Washington	53	14	0	1	1
TOTAL	257	58	5	3	8

Of the 58 avians tested, 10 were crows and 48 were "other" birds (a detailed table of avian surveillance by species, can be found in the Appendix). The first bird (crow) that tested positive for WNV was reported on August 12, 2004. A total of five birds (1 crow, 3 bluejays, 1 grackle) from 4 towns tested positive. In addition three bluejays tested positive for EEE.

Mosquito Surveillance

A total of 3062 mosquito pools (22,150 mosquitoes) were submitted for arboviral testing in 2004. Approximately 55.2% of all pools were collected in Washington County, 15.9 % in Providence County, 14.3 % in Newport County, and 11.5 % and 4 % in Kent County and Bristol County, respectively. See Table 2 for the distribution of all collected mosquito pools by county.

Table 2: Mosquito surveillance by county, 2004, Rhode Island			
County	# pools collected (# mosquitoes in pool)	# WNV Positive pools (Mosquito species)	# EEE Positive pools (Mosquito species)
Bristol	123 (574)	0	0
Kent	353 (2796)	0	1 (<i>Aedes dupreei</i>)
Newport	437 (2810)	0	0
Providence	487 (1818)	0	0
Washington	1690 (14152)	0	5 (2 <i>Culiseta impatiens</i> , <i>Aedes trivittatus</i> , 1 <i>Culex territans</i>)

No mosquito pools tested positive for WNV, however seven mosquito pools tested positive for EEE during the 2004 season. The first EEE positive mosquito pool (*Ochlerotatus trivittatus*) was collected on July 19, 2004 (Figure 1). Positive pools were identified in four Rhode Island towns. Positive EEE pools included one pool of *Ochlerotatus trivittatus*, one pool of *Ochlerotatus dupreei*, three pools of *Culiseta impatiens* and two pools of *Culex territans*. The distribution of mosquito species collected for testing can be found in Table 3.

Table 3: Mosquito surveillance by species, 2004, Rhode Island				
Scientific Name	Number Pools Collected	Number of Mosquitoes	Number of positive WNV pools (Number in pools)	Number of positive EEE pools (Number in pools)
<i>Aedes aegypti</i>	20	60		
<i>Aedes albopictus</i>	2	17		
<i>Aedes cinereus</i>	57	424		
<i>Aedes sp.</i>	3	10		
<i>Aedes trichurus</i>	2	2		
<i>Aedes vexans</i>	590	5356		
<i>Anopheles crucians</i>	2	2		
<i>Anopheles punctipennis</i>	146	359		
<i>Anopheles quadrimaculatus</i>	24	49		
<i>Anopheles walkeri</i>	13	22		
<i>Coquillettidia perturbans</i>	102	636		
<i>Culex pipiens</i>	128	581		
<i>Culex restuans</i>	12	77		
<i>Culex salinarius</i>	12	140		
<i>Culex tarsalis</i>	5	8		
<i>Culex territans</i>	68	411		2 pools (19)
<i>Culiseta impatiens</i>	186	1403		3 pools (44)
<i>Culiseta incidens</i>	1	1		
<i>Culiseta inornata</i>	20	98		
<i>Culiseta melanura</i>	34	122		
<i>Culiseta morsitans</i>	50	222		
<i>Ochlerotatus abseratus</i>	18	131		
<i>Ochlerotatus atlanticus</i>	1	1		
<i>Ochlerotatus atropalpus</i>	1	1		
<i>Ochlerotatus aurifer</i>	18	27		
<i>Ochlerotatus campestris</i>	9	44		
<i>Ochlerotatus canadensis</i>	169	2474		
<i>Ochlerotatus cantator</i>	166	1180		
<i>Ochlerotatus dorsalis</i>	5	12		
<i>Ochlerotatus dupreei</i>	1	1		1 pool (1)
<i>Ochlerotatus excrucians</i>	160	1165		
<i>Ochlerotatus fitchii</i>	2	2		
<i>Ochlerotatus flavescens</i>	1	7		
<i>Ochlerotatus grossbecki</i>	5	13		
<i>Ochlerotatus hendersoni</i>	1	16		
<i>Ochlerotatus impiger</i>	11	27		
<i>Ochlerotatus implicatus</i>	37	157		
<i>Ochlerotatus intrudens</i>	157	911		
<i>Ochlerotatus j. japonicus</i>	103	235		
<i>Ochlerotatus nigripes</i>	5	6		
<i>Ochlerotatus pionips</i>	1	1		
<i>Ochlerotatus provocans</i>	7	18		
<i>Ochlerotatus punctor</i>	39	173		
<i>Ochlerotatus s. spenceri</i>	23	47		
<i>Ochlerotatus sollicitans</i>	81	732		

Scientific Name	Number Pools Collected	Number of Mosquitoes	Number of positive WNV pools (Number in pools)	Number of positive EEE pools (Number in pools)
<i>Ochlerotatus sticticus</i>	28	185		
<i>Ochlerotatus stimulans</i>	26	76		
<i>Ochlerotatus taeniorhynchus</i>	188	3249		
<i>Ochlerotatus thibaulti</i>	1	2		
<i>Ochlerotatus triseriatus</i>	88	273		
<i>Ochlerotatus trivittatus</i>	87	446		1 pool (3)
<i>Orthopodomyia signifera</i>	1	1		
<i>Psorophora cyaneescens</i>	1	2		
<i>Psorophora ferox</i>	60	273		
<i>Toxorhynchites r. rutilus</i>	1	1		
<i>Uranotaenia sapphirina</i>	65	187		
<i>Wyeomyia smithii</i>	7	32		

Veterinary Surveillance

2004 was a quiet year for veterinary surveillance compared to the 2003 season. One horse tested positive for EEE, compared to the five positive EEE horses, two positive WNV horses, and one horse that was infected with both EEE and WNV in 2003. In addition to the horses, two emus tested positive for EEE in 2003.

The four-year-old positive EEE horse became ill on September 26, 2004, with encephalitic symptoms, and was euthanized at Tufts University School of Veterinary Medicine in Massachusetts. EEE testing was performed by the Massachusetts Department of Health. The horse was stabled in a backyard farm in the Crandall Road area of Tiverton. It was not vaccinated against the disease. Two other suspect horses were tested but were negative on serum for EEE and WNV.

Human Surveillance

From June 3 to December 5, 2004, the HEALTH Lab tested 111 acute serum specimens, 70 convalescent specimens and 114 cerebrospinal fluid specimens from 134 persons with suspect WNV infection. Of those tested, 2 patients were reported with encephalitis, and the rest of the patients were reported as aseptic meningitis (age > 17 years).

The lab received and tested specimens on an additional 38 patients, who included patients from out of state, patients with other clinical conditions, and patients where no epidemiologic follow-up was conducted or the patient did not meet the surveillance definition. Enterovirus was isolated from three of these patients.

Despite extensive testing follow-up, no human cases of WNV or EEE were identified in 2004.

Comparison of National and Rhode Island WNV Surveillance

1999	28 counties in 4 states reported any WNV activity
2000	136 counties in 12 states & DC reported any WNV activity
2001	358 counties in 27 states & DC reported any WNV activity
2002	2,480 counties in 44 states & DC reported any WNV activity
2003	1,890 counties in 46 states & DC reported any WNV activity
2004	*** counties in 47 states, DC, NYC and PR reported any WNV activity

Reported Human WNV Disease Cases, United States, 1999-2004 YTD*					
Year	Cases	Deaths	States	Counties	Onset Dates
1999	62	7	1	6	August 2-September 24
2000	21	2	3	10	July 20-September 27
2001	66	9	10	40	July 13-December 7
2002	4156	284	39 & DC	708	May 19-December 14
2003	9862	264	46 & DC	1079	April 14 – December 5
2004	2470	88	40, & DC & NYC	505	April 23 – November 16
* 2004 YTD totals are as of 1/11/2005					

Reported Human WNV Disease Cases, Rhode Island, 1999-2004		
Year	Number of persons tested	Number of persons positive for WNV
1999	0	0
2000	42	0
2001	43	0
2002	82	2
2003	120	7
2004		0

WNV Surveillance, US, 1999-2004*, Summary of Mosquito Data					
Year	# of positive pools	# of species	Earliest + pool	States	Counties
1999	18	6	9/12/99	3	8
2000	515	17	7/7/00	5	38
2001	919	27	5/31/01	16 & D.C.	70
2002	6033	29	5/22/02	33 & D.C.	---
2003	8384	51	1/18/03	41 & D.C.	944
2004	8371	48	2/10/04	40 & D.C.	412
* 2004 YTD totals are as of 1/11/2005					

WNV Surveillance, Rhode Island, 1999-2004, Summary of Mosquito Data					
Year	# of collected pools	# positive pools	Number of species	Earliest + pool	Counties
1999	0	0	0	0	0
2000	1113	0	0	0	0
2001	1856	14	8	7/16/01	3
2002	1417	4	3	8/28/02	2
2003	2383	7	2	8/21/03	3
2004	3062	0	0	---	---

WNV Surveillance, US, 1999-2004 YTD*, Summary of Dead Bird Data			
Year	# of positive birds	States	Counties
1999	249	4	28
2000	4305	12 & D.C.	136
2001	7332	26 & D.C.	328
2002	15,745	42 & D.C.	1888
2003	12,066	44 & D.C.	1689
2004	7331	46 & NYC	971
* 2004 YTD totals are as of 1/11/2005			

WNV Surveillance, Rhode Island, 1999-2004, Summary of Dead Bird Data					
Year	Number of birds reported	Number of birds tested	Number of birds positive	Earliest + reported	Counties
1999	0	0	0	0	0
2000	1466	365	88	8/14/00	4
2001	1324	390	245	5/30/01	5
2002	1441	249	167	6/17/02	5
2003	651	75	47	8/14/03	5
2004	257	58	5	8/12/04	2

WNV Surveillance, US, 1999-2004* YTD, Summary of Equine Data			
Year	# of equine cases	States	Counties
1999	25	1	2
2000	63	6	26
2001	731	19	125
2002	12038	39	1678
2003	5145	40	1271
2004	1386	38	415
* 2004 YTD totals are as of 1/11/2005			

WNV Surveillance, Rhode Island, 1999-2004, Summary of Equine Data			
Year	# of equine cases	County	Month of onset
1999	0	---	---
2000	1	Washington	August
2001	0	---	
2002	1	Kent County	October
2003	3	Providence (1), Washington (2)	September
2004	1		

APPENDIX

Table 4: Distribution of avians tested, Rhode Island, 2001-2004				
Species	2001	2002	2003	2004
Bald Eagle	1			
Barred owl		1		1
Blue jay	56	24	21	26
Cardinal		1		
Catbird	2	1		1
Chicken, R.I. Red		2		
Cockatiel	1	1	1	
Cooper's Hawk			3	
Cormorant				1
Crow	262	198	39	10
Domestic Turkey			1	
Duck				
Finch	2			
Fish Crow				4
Flicker				
Gold finch	2		1	
Grackle	19	3	1	3
Great Cormorant	1		1	
Great Horned Owl			2	
Hawk	3	4		1
Homing Pigeon			3	
House finch	2			
Kingfisher			1	
Laughing gull	4			
Mockingbird				2
Mourning dove	6	4		2
Mute swan		1		
Osprey	1	1		
Parakeet	2	1		
Parrot		2		
Peacock				1
Pigeon				3
Red tailed hawk	1	1		
Robin	2	1		
Rock dove	7			
Sandpiper		2		
Screech Owl	1			
Sea gull		1		
Sharp-shinned hawk	1			
Sparrow Sp.	7			2
Starling	3			
Thrush	2			1
Turkey Vulture			1	
Warbler				
Woodpecker				

Table 5: Distribution of mosquito species tested, Rhode Island, 2003-2004						
Scientific Name	Number Trapped and Tested, 2003	Number WNV positive, 2003	Number EEE positive, 2003	Number Trapped and Tested, 2004	Number WNV positive, 2004	Number EEE positive, 2004
<i>Aedes vexans</i>	2436			5356		
<i>Anopheles crucians</i>	25			2		
<i>Anopheles punctipennis</i>	730			359		
<i>Anopheles quadrimaculatus</i> s.l.	46			49		
<i>Coquillettidia perturbans</i>	1540			636		
<i>Culex pipiens</i>	5584	5 pools – (3), (7), (9), (45), (50) mosquitoes	11 pools – (39), (50), (50), (46), (36), (32), (46), (50), (20), (9), (16) mosquitoes	581		
<i>Culex restuans</i>	108			77		
<i>Culex salinarius</i>	87			140		
<i>Culex territans</i>	0			411		2 pools – (16), (3) mosquitoes
<i>Culiseta impatiens</i>	166	1 pool – (4) mosquitoes		1403		3 pools - (3), (29), (12) mosquitoes
<i>Culiseta morsitans</i>	688	1 pool – (8) mosquitoes	6 pools – (8), (50), (3), (4), (9), (5) mosquitoes	222		
<i>Ochlerotatus abserratus</i>	1			131		
<i>Ochlerotatus aurifer</i>				27		
<i>Ochlerotatus canadensis</i>	6662			2474		
<i>Ochlerotatus cantator</i>	255			1180		
<i>Ochlerotatus cinereus</i>	74			424		
<i>Ochlerotatus dupreei</i>	0			1		1 pool – (1) mosquito
<i>Ochlerotatus excrucians</i>	267			1165		
<i>Ochlerotatus intrudens</i>	2			911		
<i>Ochlerotatus japonicus</i>	462			235		
<i>Ochlerotatus punctor</i>	63			173		
<i>Ochlerotatus sollicitans</i>	581			732		
<i>Ochlerotatus sticticus</i>	8			185		
<i>Ochlerotatus stimulans</i>	1			76		
<i>Ochlerotatus taeniorhynchus</i>	998			3249		
<i>Ochlerotatus triseriatus</i>	567			273		
<i>Ochlerotatus trivittatus</i>	249			446		1 pool – (3) mosquitoes
<i>Orthopodomyia signifera</i>	1			1		
<i>Psorophora ferox</i>	75			273		
<i>Uranotaenia sapphirina</i>	276			187		

Figure 1. Arbovirus Surveillance, Rhode Island, 2003

Timeline of Arboviral Activity, Rhode Island, 2004

First positive EEE pool collected on 7/19/2004

First positive WNV avian reported on 8/12/2004

First positive EEE avian reported on 8/17/2004

EEE positive equine with illness onset on 9/26/2004

Note: No human activity or positive WNV mosquito pools were documented in 2004.